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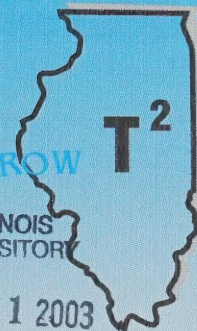
ILLINOIS INTERCHANGE

TECHNOLOGY TRANSFER TODAY

FOR TOMORROW

ILLINOIS
DEPOSITORY

OCT 31 2003



BUREAU OF LOCAL ROADS AND STREETS

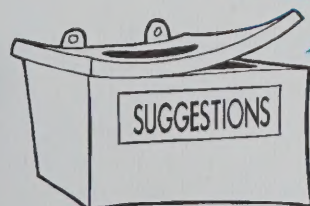
UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN
TRANSPORTATION QUARTERLY

Vol. 11 No. 3

Special Edition 2003

Technology Transfer Center 2003 - 2004 Training Program

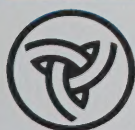
SEND your
Enrollment Requests
in ASAP!
Some classes fill
up quickly!



INSIDE:

- ♦ Training Program Policies 2
- ♦ Course Descriptions 3-9
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Form 19

Please pass this on to other
interested parties in your office.



Illinois Department of Transportation

2003 - 2004 Training Program

The courses listed on the following pages constitute the 2003-2004 Technology Transfer Training Program. These courses are scheduled to be presented on the dates shown and at the locations indicated. As you view the list, **NOTE THE PREREQUISITES** for many of the courses, especially those relating to math or computers. Instruction is geared toward those students who have the necessary prerequisite skills. These classes are all tuition-free. Travel, meals and lodging expenses, are always the responsibility of the student.

ENROLLMENT: We invite your agency to enroll students in the classes you desire by filling out the enrollment form. Please **type or clearly print** the enrollment information completely as this information will be entered in our computer for later use on mailings, rosters and certificates. Return the attached enrollment form by using one of the following methods:



BY MAIL:

Illinois Department of Transportation
Bureau of Local Roads and Streets
Technology Transfer Center
2300 S. Dirksen Parkway, Room 205
Springfield, IL 62764

BY FAX: You may fax your enrollment form by dialing 217/785-7296.

It is important that you **send your enrollments in early**. Some classes fill up quickly and we may not be able to schedule additional classes. Enrollments

must be received no later than 3 weeks prior to a class. A letter of confirmation will be sent to you once your enrollment has been processed.



The confirmation letter and attached summary are sent to notify you that we did receive your enrollment form and have entered it as shown. When you receive this letter, please check the summary for accuracy of class enrollments and spelling of names. If you need to make any changes, please contact our office.

In cases of excess enrollment, some attendance restrictions will be imposed and in cases of insufficient enrollment, classes may be cancelled. Enrollment in a class will be handled in accordance with our policy below.

ENROLLMENT POLICY: If a class is filled, our enrollment policy gives Local Agencies and Department personnel priority over other enrollments.

The confirmation letter you receive is **only** to let you know that we did receive your enrollment form. We will continue to enter enrollments in our computer until three weeks prior to a class. We will then determine if we have more enrollments than we have space. If this occurs, Local Agencies and Department personnel will be given priority to attend the class. Other enrollments will be placed in the class on a first come, first served basis.

If a class has more Local Agency personnel enrolled than we have space, then placement will be on a first come, first served basis. Therefore, it is extremely important to get your enrollments in as soon as possible. It is also essential to let us know as far in advance as possible, when it is necessary to cancel an enrollment in a class. This will afford us the time and opportunity to accommodate other students who wish to attend the class.

Your **contact person** will receive a letter approximately 2 weeks prior to the class confirming your registration and giving the classroom information. All others will be notified that they have been placed on a waiting list and will be contacted if there are further cancellations.

CONSULTANT POLICY: Enrollment for Consultants will be allowed in all Technology Transfer Training classes with the exception of Backhoe Safety, Documentation and Flagger Training.

Consultant registration requests for Documentation of Contract Quantities will only be accepted by the Central Bureau of Construction and is on a first-come, first-served basis so requests in writing are required. See the Documentation course description on page 4 for further enrollment details. Flagger Training is for Local Agency operations only.

Due to the popularity of our classes, **we must limit each Consulting firm to a maximum of four students per class.**

CERTIFICATES: A Certificate of Completion will be awarded to those students who successfully complete the final examination for the class. In those classes where final exams are not given, a Certificate of Attendance will be awarded. The majority of T² Classes meets the requirements for Professional Development Hours (PDH's). The number of PDH's given per class can be found with the course description.

Please Note:

Attendance at T² training classes by students who have not enrolled through the Center has led to some classes being overcrowded and has created problems with record keeping and certificate distribution.

Instructors will not admit students into their classes if not enrolled through the Center. Certificates will not be issued to students that have not pre-enrolled.

We want to be fair to those agencies that have enrolled early and have followed our enrollment guidelines - especially those that have been placed on a waiting list for attendance. If you have any questions, contact Kevin Burke at (217) 785-5048.

Technology Transfer Training Program

Backhoe Safety and Rehabilitating Streets and Highway Classes To Be Scheduled

The Technology Transfer Center Staff is working with different backhoe manufacturers throughout the state to schedule some backhoe safety classes **for local agencies only**. Due to the projected popularity of this course, we may need to limit each local agency to a maximum of 2 students per class.

We are also in the process of redeveloping the Rehabilitating Streets and Highways class. Information on these courses will be mailed as soon as the class scheduling is complete. Thanks for your patience.

COURSE DESCRIPTIONS: 2003 - 2004

Bridge Construction Inspection

PURPOSE: This course will enable students to inspect the construction of bridges to ensure compliance with plans and specifications.

√ PREREQUISITES: Mathematics Refresher Course, Units 1 through 15, or equivalent; familiarity with bridge terminology; and probability of assignment to bridge construction inspection within 18 months.

TOPICS TO BE COVERED: Bridge foundations, substructures, steel superstructures, concrete superstructures, deck paving and documentation.

LENGTH OF COURSE: 2 days.

PDH's: 12.0

Confined Space Awareness

PURPOSE: To familiarize the student with what a confined space is, how to recognize hazards and prepare for safety.

TOPICS TO BE COVERED: Confined space hazards, Federal and State laws, definitions of what a confined space is, air monitoring and applicable policies.

LENGTH OF COURSE: 2 hours.

PDH's: 2.0

NOTE: This is a 2 hour class that will be offered in the morning and the Trenching and Shoring Safety Class will be offered in the afternoon. Those students who wish may enroll in both classes for the same day.

Culvert Hydraulics

PURPOSE: To enable the student, with some supervision, to establish design constraints and size culverts using both a manual solution (HDS5) and computer applications.

√ PREREQUISITES: Mathematics Refresher Course, Units 1 through 17, or equivalent; familiarity with basic computer usage and hydraulic terminology, ability to read and understand nomographs; the probability of being involved in culvert design.

TOPICS TO BE COVERED: Selecting design parameters, determining the headwater depth and outlet velocity for a pipe or box culvert with inlet or outlet control, use of FHWA culvert nomographs, and use of FHWA's culvert computer program (HY8).

LENGTH OF COURSE: ½ day.

PDH's: 3.0

Documentation

(for Local Agency Highway Personnel Only)

PURPOSE: To provide the student with the ability to document, with some supervision, contract quantities to Federal and State standards.

- ✓ PREREQUISITES: Mathematics Refresher Course, Units 1 through 15, or equivalent; **one year construction experience** and familiarity with general highway construction terminology and practice.

TOPICS TO BE COVERED: Project diary entries; quantity book preparation and entries; cross-reference system; extra work reports, and the measurement and calculation of pay items for pay quantities occurring in road and bridge plans.

LENGTH OF COURSE: 3 days.

PDH's: 18.0

NOTE: The Technology Transfer Documentation classes will be offered to local agency personnel only. Consultant registration for Documentation of Contract Quantities is on a first-come, first-served basis so requests in writing are required. A Bureau of Construction Registration Form (available on the web site at <http://www.dot.state.il.us/contractquantities/registration.html>) is required for each individual wishing to attend class. Requests will be accepted via fax at 217/524-4922, Attn: Documentation Registration, or by e-mail at cbctraining@nt.dot.state.il.us. Consultant registration requests will only be accepted by the Central Bureau of Construction. Requests by phone and requests prior to the posted registration dates will not be accepted.

Erosion Control

PURPOSE: To familiarize the student with different types of erosion control methods that are available, and to discuss when, where, and how to install each type.

- ✓ PREREQUISITES: Mathematics Refresher Course, Units 1 through 5 or equivalent.

TOPICS TO BE COVERED: Temporary and permanent erosion control measures, planned management design, NPDES permits, seeding, mulching, erosion control blankets, and IDOT erosion control design standards.

LENGTH OF COURSE: 1 day.

PDH's: 6.0

Flagger Training

(for Local Agency Highway Personnel Only)

PURPOSE: This class provides training to local agency personnel for their day labor and maintenance activities. It meets requirements established by the Manual on Uniform Traffic Control Devices (MUTCD) and the Occupational Safety and Health Administration.

- ✓ PREREQUISITES: This course is available to local agency highway personnel holding a valid driver's license or an Illinois Identification Card from the Secretary of State.

TOPICS TO BE COVERED: Traffic control devices, the flagger's role in work zone safety, Illinois laws and responsibilities, and flagging procedures.

LENGTH OF COURSE: ½ day.

PDH's: 3.0

NOTE: This class does not meet the flagger certification requirements for projects constructed in accordance with the Standard Specifications for Road and Bridge Construction published by the Illinois Department of Transportation. A Flagger Training Card may not be used in place of a Certified Flagger Card.



Hazardous Materials First Responder

PURPOSE: This training is intended to meet the requirements of the Occupational Safety and Health Administration and United States Environmental Protection Agency (OSHA/USEPA) Hazardous Waste Operations and Emergency Response Final Rule (29 CFR 1910.120, effective March 6, 1990) and is for personnel who may be the first-on-the scene at a hazardous materials incident.

TOPICS TO BE COVERED: Basic hazard recognition, identification, reporting, and self-protection for individuals who may do preliminary observation of an event. *It does not provide the necessary hazard recognition and protective skills to equip you to deal effectively and safely with activities beyond the awareness level.*

LENGTH OF COURSE: 1 day.

PDH's: 6.0

Highway Engineering Principles

PURPOSE: For engineering and technical employees to familiarize or review their knowledge of highway terminology and procedures used in conjunction with a construction or maintenance project from its initial stage to final completion.

✓ PREREQUISITES: Mathematics Refresher Course, Units 1 through 17 or equivalent; involvement in highway design or highway project development activities.

TOPICS TO BE COVERED: Basic mathematics; Standard Specifications; reading plans, specifications, material proposals, maintenance procedures and final papers.

LENGTH OF COURSE: 1 day.

PDH's: 6.0

Highway Signing

PURPOSE: Placement of traffic signing to help ensure highway safety by providing for the orderly and predictable movement of all traffic, motorized and non-motorized, throughout the highway system, and to provide such guidance and warnings as are needed to ensure the safe and informed operation of individual elements of the traffic stream.

✓ PREREQUISITES: The probability of assignment to sign erection responsibilities.

TOPICS TO BE COVERED: Traffic control sign design, placement, uniformity and maintenance.

LENGTH OF COURSE: 1 day.

PDH's: 6.0

MFT Accounting and Auditing

PURPOSE: This course will enable students to properly record and account for MFT funds utilized on local agency projects.

TOPICS TO BE COVERED: Accounting and auditing principles of MFT funds as established by the Illinois Department of Transportation.

LENGTH OF COURSE: 1 day.

PDH's: N/A

OSHA 10-Hour

PURPOSE: To provide safety training for highway personnel on several work related topics. Participants receive an OSHA safety certificate.

TOPICS TO BE COVERED: Cranes, electrical, hazard communication, ladders & stairs, fire protection, personal protection equipment, material handling, tools, walking working surfaces, and welding safety.

LENGTH OF COURSE: 1½ days.

PDH's: 10.0

Pavement Construction Inspection

PURPOSE: To enable the student to inspect the construction of bituminous surface treatments, asphalt concrete and PCC pavements to ensure compliance with plans and specifications.

- ✓ PREREQUISITES: Mathematics Refresher Course, Units 1 through 15, or equivalent; and the probability of inspection of pavement construction within 18 months.

TOPICS TO BE COVERED: Bases: granular and stabilized; Surface Treatment: preparation and prime, design, and construction control; Bituminous Concrete: road mix and low and high quality plant mixes; Portland Cement Concrete: concrete placement, reinforcement, joints, finishing and curing, intersection joint design and field layout.

LENGTH OF COURSE: 3 days.

PDH's: 18.0

Pavement Maintenance

PURPOSE: To enable student to recognize the causes of pavement failure and to make and/or recommend corrective measures including alleviating the cause, selecting the proper materials and methods, and documenting the work accomplished. Discusses various types of road surfaces with the emphasis on flexible bases and developing a pavement management system.

- ✓ PREREQUISITES: Knowledge of equipment and materials (particularly asphaltic materials); and probability of involvement in scheduling pavement maintenance activities.

TOPICS TO BE COVERED: Drainage and subsurface maintenance; patching and resurfacing material; street patching methods; portland cement concrete, and utility cuts; seal coats and crack sealing; and developing a systematic approach to pavement maintenance.

LENGTH OF COURSE: 1 day.

PDH's: 6.0

Small Drainage Structure Construction Inspection

PURPOSE: This course will enable students to inspect the construction of pipe culverts, storm sewers and related structures to ensure compliance with plans and specifications.

- ✓ PREREQUISITES: Mathematics Refresher Course, Units 1 through 15, or equivalent; familiarity with bridge and culvert terminology; and probability of assignment to drainage structure inspection within 18 months.

TOPICS TO BE COVERED: Culvert - Sewer differences, trenching, bedding, pipe installation, backfill, and documentation. Precast concrete box culverts, pipe liners, and other new methods will also be reviewed.

LENGTH OF COURSE: 2 days.

PDH's: 12.0

Snow Removal and Ice Control for New Drivers

PURPOSE: Introduction to snow removal and ice control operations; including major components, equipment adjustment and calibration, and proper snow and ice control methods.

✓ **PREREQUISITES:** Probability of assignment to snow removal responsibilities within 12 months.

TOPICS TO BE COVERED: Equipment preparation; snow removal procedures and methods; special situations; after-storm procedures; spreader calibration; public relations; and safety.

LENGTH OF COURSE: 1/2 day. All snow removal and ice control classes start at 8:30 a.m., if this class becomes full a second class will be held at 1:00 p.m.

PDH's: N/A

NOTE: Copies of the video used in this class are available for Local Agencies who would want a copy for their own training purposes. Copies may be obtained through the Video/Publication Library Catalog.

Structure Information & Management Systems (SIMS)

PURPOSE: To introduce students to SIMS concepts, including its relationship to the Structure Information and Procedure (SIP) Manual and the Illinois Structure Information System (ISIS).

✓ **PREREQUISITES:** Knowledge of Microsoft Access is helpful but not required.

TOPICS TO BE COVERED: Students will learn how to use all the reports and forms already available in SIMS, and will also learn how to use SIMSLink, which allows the user to create simple queries and reports. Computers will be provided for "hands-on" training and handouts will also be provided.

LENGTH OF COURSE: 1 day.

PDH's: 6.0



Survey I - Beginning



PURPOSE: To enable potential survey personnel, with some supervision, to know the use and care of basic surveying instruments and equipment.

✓ **PREREQUISITES:** Mathematics Refresher Course, Units 1 through 17, or equivalent. Ability to perform math equations on a calculator.

TOPICS TO BE COVERED: Surveying mathematics; use, care and maintenance of the transit, level and chain; horizontal angle measurements with transit; leveling and the leveling rod; chaining; field note-keeping and safety.

LENGTH OF COURSE: 3 days.

PDH's: 18.0

Remember to type or clearly print your enrollment form and send it in as soon as possible!



Survey II - Intermediate

(Highway Construction Surveying)

PURPOSE: To enable the student, with some supervision, to establish the alignment of the route and to obtain data necessary for the preparation of highway construction plans.

- ✓ PREREQUISITES: Mathematics Refresher Course, Units 1 through 17, or equivalent; knowledge of basic surveying operations and familiarity with surveying instruments and equipment; familiarity with surveying and construction terms, or completion of Beginning Surveying Class. Ability to perform math equations on a calculator.

TOPICS TO BE COVERED: Horizontal alignment; vertical alignment; horizontal and vertical curves; super-elevations, topography; cross sectioning; and traversing.

LENGTH OF COURSE: 4 days.

PDH's: 24.0

Survey III - Construction Staking

PURPOSE: To enable the student, with some supervision, to stake common construction jobs.

- ✓ PREREQUISITES: Attendance in both the Beginning and Intermediate Surveying classes or equivalent experience.

TOPICS TO BE COVERED: Staking theory, special staking, slope staking, bridge staking, culvert staking and pavement staking.

LENGTH OF COURSE: 3 days.

PDH's: 18.0

***Survey Enrollees Please Note:** Mathematics and field work are important parts of surveying instruction. The surveying courses have been updated to provide more of these elements. The first day of the Survey I class provides essential survey math instruction. This means that less math instruction will be offered in the Survey II and III classes so that field exercises can be added (weather permitting). **We strongly suggest that students enroll in Survey I prior to enrolling in Survey II & III or be proficient in math and able to perform trigonometric calculations on a calculator.**

Survey IV - Mapping (Legal Description, GPS & State Plane Coordinates)

PURPOSE: Provides the ability to utilize descriptions of land and maps for highway use, explains Global Positioning Systems and State Plane Coordinates.

- ✓ PREREQUISITES: Knowledge of surveying operations, familiarity with surveying terminology, and equivalent surveying math skills.

TOPICS TO BE COVERED: Use of different types of maps (Quad and USGS), use of stereoscopes, rectangular survey, legal descriptions, GPS, and conversion to state plane coordinates.

LENGTH OF COURSE: 2 days.

PDH's: 12.0

Team Building for Supervisors and Crew Leaders

PURPOSE: Stresses the importance of team building. Provides management and conflict resolution techniques to perform more effectively and efficiently.

TOPICS TO BE COVERED: The importance of team building, management and conflict resolution techniques.

LENGTH OF COURSE: 1 day.

PDH's: 6.0

Trenching and Shoring Safety

PURPOSE: To provide students with safety procedures to follow when involved in trenching and shoring operations.

TOPICS TO BE COVERED: Utility notification, soil mechanics, slope requirements, manual and visual testing, shoring techniques and equipment.

LENGTH OF COURSE: 2 hours.

PDH's: 2.0

NOTE: This is a 2 hour class that will be offered in the afternoon after the Confined Space Awareness Class. Those students who wish may enroll in both classes for the same day.

Understanding Specifications

PURPOSE: This course will enable students to identify the different types of contract documents and explain the hierarchy of these contract documents, to understand the format and use of the Standard Specifications, and to determine when and how to write effective special provisions and plan notes.

✓ PREREQUISITES: Involvement in highway design, highway project development, or highway construction activities.

TOPICS TO BE COVERED: Specifications, special provisions, pay items, and plans.

LENGTH OF COURSE: 1 day.

PDH's: 6.0

Urban Tree Preservation-Protection

PURPOSE: To familiarize the student with how to preserve and protect valuable tree resources during construction and development.

TOPICS TO BE COVERED: When to save a tree or forested area, when to use a tree bank system and when to do a land swap.

Tree protection and tree preservation policies will be provided and discussed along with case examples from local units of government. Examples of construction designs in limited areas will be provided. Establishment of urban forestry programs and proper tree planting care will be addressed.

LENGTH OF COURSE: 1 day.

PDH's: 6.0

Work Zone Safety for Projects (Crews)

PURPOSE: To provide the student with the basic elements required for work zone traffic control and protection.

TOPICS TO BE COVERED: Need for traffic control, laws and legal considerations, applicable portions of the Manual on Uniform Traffic Control Devices, developing traffic control plans, work zone traffic control and the Work Area Protection Guide for street and utility repairs.

LENGTH OF COURSE: 1 day.

PDH's: 6.0

T2 Training Program			2003			2004			
COURSE	#	LOCATION	OCT	NOV	DEC	JAN	FEB	MAR	APR
Bridge Construction Inspection	1	Springfield			9-10				
Confined Space Awareness	2	Springfield				8			
	3	Woodstock						10	
Culvert Hydraulics	4	Springfield					27		
Documentation	5	Schaumburg				13-15			
	6	Peoria					3-5		
Erosion Control	7	Peoria				6			
	8	Oglesby					10		
	9	Glen Ellyn						11	
Flagger Training	10	Urbana						4	
	11	Mattoon						9	
	12	Peoria						18	
	13	Glenview							6
	14	Carbondale							21
	15	Moline							21
Haz. Mat. First Responder	16	Mattoon			10				
	17	Glenview				13			
	18	Glen Ellyn						18	
Highway Engineering Principles	19	Schaumburg					3		
Highway Signing	20	Schaumburg					18		
	21	Mattoon					26		
MFT Accounting and Auditing	22	Peoria					25		
	23	Schaumburg						16	
	24	Edwardsville							6
	25	Springfield							14
OSHA 10-Hour	26	Glenview				27-28			
Pavement Const. Inspection	27	Carbondale				13-15			
	28	Springfield					17-19		
	29	Glen Ellyn						15-17	
Pavement Maintenance	30	Glenview	28						
	31	Woodstock		4					
Small Drainage Structure Inspection	32	Schaumburg						10-11	
	33	Moline							7-8

T2 Training Program			2003			2004			
COURSE	#	LOCATION	OCT	NOV	DEC	JAN	FEB	MAR	APR
Snow and Ice Control	34	Carbondale	9						
	35	Peoria	29						
	36	Glen Ellyn		6					
	37	Moline			3				
Street Sweeping-Air	38	Elgin			3				
Street Sweeping-Mechanical	39	Elgin			2				
Structure Information & Management Systems (SIMS)	40	Dixon						10	
	41	Paris						18	
	42	Schaumburg						24	
	43	Schaumburg						25	
	44	Springfield						30	
	45	Springfield							15
	46	Peoria							20
Survey I - Beginning	47	Schaumburg				20-22			
	48	Bloomington				27-29			
Survey II - Intermediate	49	Schaumburg					24-27		
	50	Bloomington						2-5	
Survey III - Construction Staking	51	Schaumburg						29-31	
	52	Bloomington							13-15
Survey IV - Mapping	53	Schaumburg							7-8
Team Building	54	Woodstock					10		
	55	Schaumburg						23	
Trenching and Shoring Safety	56	Springfield				8			
	57	Woodstock						10	
Understanding Specifications	58	Schaumburg		5					
	59	Peoria			3				
Urban Tree Preservation-Protection	60	Schaumburg					5		
	61	Mattoon							7
	62	Peoria							21
Work Zone Safety (Crews)	63	Urbana			9				
	64	Woodstock					11		
	65	Glen Ellyn						24	

2003 - 2004 T2 Classes	North Location		Central Location		South Location
	Schaumburg	Other Cities	Springfield	Other Cities	Other Cities
Bridge Construction Inspection			Dec. 9-10		
Confined Space Awareness		Woodstock: Mar. 10	Jan. 8		
Culvert Hydraulics			Feb. 27		
Documentation	Jan. 13-15			Peoria: Feb. 3-5	
Erosion Control		Oglesby: Feb. 10 Glen Ellyn: Mar. 11		Peoria: Jan. 6	
Flagger Training		Glenview: Apr. 6 Moline: Apr. 21		Urbana: Mar. 4 Mattoon: Mar. 9 Peoria: Mar. 18	Carbondale: Apr. 21
Haz. Mat. First Responder		Glenview: Jan. 13 Glen Ellyn: Mar. 18		Mattoon: Dec. 10	
Hwy. Engineering Principles	Feb. 3				
Highway Signing	Feb. 18			Mattoon: Feb. 26	
MFT Accounting & Auditing	Mar. 16		Apr. 14	Peoria: Feb. 25	Edwardsville: Apr. 6
OSHA 10-Hour		Glenview: Jan. 27-28			
Pavement Construction Inspection		Glen Ellyn: Mar. 15-17	Feb. 17-19		Carbondale: Jan. 13-15
Pavement Maintenance		Glenview: Oct. 28 Woodstock: Nov. 4			
Small Drainage Structure Insp.	Mar. 10-11	Moline: April 7-8			
Snow and Ice Control		Glen Ellyn: Nov. 6 Moline: Dec. 3		Peoria: Oct. 29	Carbondale: Oct. 9
Street Sweeping-Air		Elgin: Dec. 3			
Street Sweeping-Mechanical		Elgin: Dec. 2			
Structure Information & Management Systems (SIMS)	Mar. 24 Mar. 25	Dixon: Mar. 10	Mar. 30 Apr. 15	Paris: Mar. 18 Peoria: Apr. 20	
Survey I-Beginning	Jan. 20-22			Bloomington: Jan. 27-29	
Survey II-Intermediate	Feb. 24-27			Bloomington: Mar. 2-5	
Survey III-Const. Staking	Mar. 29-31			Bloomington: Apr. 13-15	
Survey IV-Mapping	Apr. 7-8				
Team Building	Mar. 23	Woodstock: Feb. 10			
Trenching & Shoring Safety		Woodstock: Mar. 10	Jan. 8		
Understanding Specifications	Nov. 5			Peoria: Dec. 3	
Urban Tree Preservation-Protection	Feb. 5			Mattoon: Apr. 7 Peoria: Apr. 21	
Work Zone Safety (Crews)		Woodstock: Feb. 11 Glen Ellyn: Mar. 24		Urbana: Dec. 9	

2003 - 2004

Page 1 of 2

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Image Inspection

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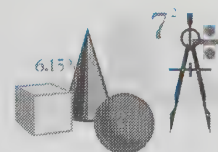
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ENROLLMENT FORM

Mathematics Refresher Course

PURPOSE: This course is designed as a math refresher for individuals planning on enrolling in the Technology Transfer Training Program. The course description specifies what level of skill must be reached in the Math Refresher course to meet the required prerequisites for that class.

FORMAT: This self study course consists of the 18 modules listed below, which can be studied either at home or on the the job. Each module has a step-by-step explanation of the subject it covers and it has job-related problems at the end of each unit. A Preliminary Screening Test can be used to determine which areas the student needs to review. This pretest is available upon request. The Preliminary Screening Test and the Math Refresher Course are both available at no cost to local agencies. The modules of the course are available with English or Metric units. Please specify your preference when completing the order blank below.



- | | | |
|-------------------------------------|---|---------------------------------------|
| 1. Addition and Subtraction | 8. Liquid and Weight Units | 14. Volume: Prisms, Average End Areas |
| 2. Multiplication and Division | 9. Averages and Percentages | 15. Volume: Cones and Combinations |
| 3. Rounding and Degrees of Accuracy | 10. Proportion | 16. Trigonometry of Right Triangles |
| 4. Fractions | 11. Square Root, Pythagorean Theorem | 17. Trigonometry of Oblique Triangles |
| 5. Formulas | 12. Area: Triangles, Rectangles, Trapezoids | 18. Metric Module |
| 6. Solving Equations | 13. Area: Circles | |
| 7. Length and Weight Units | | |

MATH REFRESHER COURSE ORDER FORM

Name _____ Title _____

Agency _____ Phone () _____

Address _____

City _____ State _____ Zip Code _____

Please send me the following items I have marked.

☐ PRELIMINARY SCREENING TEST

MATH REFRESHER COURSE MODULES

☐ METRIC

☐ ENGLISH

☐ BOTH

001	002	003	004	005	006	007	008	009
010	011	012	013	014	015	016	017	018

Mail Requests To:

Illinois Department of Transportation
Bureau of Local Roads and Streets
Technology Transfer Center - Room 205
2300 South Dirksen Parkway
Springfield, Illinois 62764
Fax Number (217) 785-7296

FOR OFFICE USE ONLY:

Order # _____

Date Rcvd. _____

Mailed _____

Flagger Training for Local Agencies

Flaggers are the most important members of your construction or maintenance crew. In order to protect your work zones, every flagger is required to know proper flagging procedures and use the appropriate equipment. Chapter 6E of the Manual on Uniform Traffic Control (MUTCD) contains all of the flagger requirements and recommendations. The MUTCD may be downloaded at <http://mutcd.fhwa.dot.gov/index.htm>.

The Technology Transfer Center offers Flagger Training as part of our training program. We have two dedicated instructors that will come to your location and train your employees in proper procedures. A minimum of 25 people is required to offer this training. If you do not have this many employees, work with other local agencies in your area to organize a joint class.

Who should receive this training? This training is appropriate for any local agency employee who may perform as a flagger in emergency or non-emergency situations. This includes highway department employees (workers and supervisors), public utility employees, police officers, and firemen (volunteer and full-time).

If you would like to schedule a class in your area please fill out the form below and mail it to the Illinois Department of Transportation, Technology Transfer Center, 2300 South Dirksen Parkway, Room 205, Springfield, Illinois 62764 or fax it at (217) 785-7296.



Flagger Training Class Request

Agency _____

Contact Person _____ Number of Students _____

Agency Address _____

City _____ State _____ Zip Code _____

Phone _____ Requested Training Date _____

Have your employees taken our course before? Yes No

Training Room on Site? Yes No Could other agencies attend? Yes No

TV/VCR? Yes No

Flagger Training is for Local Agency personnel only.

Videotape Library New Additions

The following videotapes have recently been added to the videotape library. If you would like to borrow any of these videos, please complete the Video/Publication request form on page 19. Tapes **V007 Brush and Tree Removal** and **V011 Mowing** have also been updated.

V078 Frost Action in Soils Explains what frost damage is and how freezing temperatures and moisture effects the subgrade, and how it can damage and deteriorate various materials through thawing and freezing cycles.

V079 Protecting Our Pavement: PREVENTIVE Maintenance This video provides information on the advantages of preventive maintenance.

V534 Construction Trenching and Shoring: Hard Hat Series OSHA estimates that approximately 90 deaths occur every year because someone didn't know basic trenching and shoring safety guidelines. The practical safeguards covered here can help prevent these needless casualties. Topics include: evaluating an excavation site, effective worker protection systems, and emergency response.

V535 Defensive Driving for Government Employees This new video program looks at techniques to help prevent accidents from happening, and in the case of unavoidable accidents, help lessen their severity. Topics include: What is defensive driving?; respect for the vehicle; your responsibility as a driver; proper/safe driving techniques; seat belts; driving in poor weather; speeding, right-of-way, passing, tailgating; and distractions and road rage.

V536 PPE: Don't Start Work Without It (Safety 101) Learn to use the right equipment for each job, and use it correctly. Topics include: eye and face protection; hearing protection; hand & foot protection; basic PPE rules.

V537 Construction Lockout/Tagout Preventing unexpected start-ups of equipment during servicing and maintenance is as easy as the six-step safety procedure summarized in this video program. Topics include: how lockout/tagout systems work; when to use lockout/tagout procedures; six steps required in lockout/tagout process.

V538 Construction Confined Space Entry Working safely in a confined space requires learning the necessary skills to prevent or escape dangerous, or even fatal accidents. Preparation begins with this overview: Identifying Confined Spaces & Their Hazards; OSHA's Confined Entry Permit Program; Duties of Confined Space Entry Team.

V539 Flagging: You're the Director The job of the flagger is crucial for preventing highway work zone accidents. However, flaggers are often not properly trained or not trained at all. This valuable video program reviews vital flagging procedures including: flagger requirements; proper clothing and equipment; flagger position; and stopping and releasing traffic.

V540 Highway Work Zone Safety: The Basics This video program will help your employees understand and comply with the MUTCD and learn what it takes to keep themselves, drivers, and pedestrians safe. Topics include: being safety conscious; traffic control devices; slowing down traffic; detours & closures; and communication.

V541 Heat Stress This video program focuses on preventing illnesses and minimizing safety hazards. Complies with NIOSH and OSHA recommendations. Topics include: hazards of hot environments and first aid.

V542 Construction Fall Protection: Get Arrested! This new program will help your employees work safer and smarter. It will also train employees on what's new, what's in and what's out, as far as fall arrest equipment and safety procedures go. Topics include: requirements for guardrail construction, strength and minimum height standards; proper anchorage techniques; when & how to use lifelines & positioning devices.

V543 Winter Safety Freezing temperatures and icy roads. They're not only uncomfortable - they can be deadly. Either on the job or during recreational time, winter weather can pose special dangers to everyone. Topics include: signs and treatment of hypothermia and frostbite; prevention of hypothermia and frostbite; and off the job winter safety.

V544 Road Rage Explains road rage and its causes from aggressive drivers to rude drivers. Various ways of stress management and ways to avoid confrontations with rude operators.

V545 FHWA Emergency Relief Program Provides step by step procedures to follow in repairing damage to federal aid highways. Discusses eligibility procedures, including Gubernatorial Proclamation. Explains procedures in emergency or permanent repairs. Assessment of damages, eligibility in permanent and or emergency repairs, explains items that are covered by ER funds and items that are not. Explains detailed damage reports, quick relief method for catastrophic damage.

V546 Stockpile Recovery to Minimize Segregation This video shows how aggregates should be stockpiled to reduce segregation.

V547 Getting Your Message Out: Evaluating Public Awareness of Transportation Issues Talks of how our transportation system affects the country. How to create positive public relations, and creating a communications plan for the public. Discusses how to work with the media, and establishing credibility with media. Emphasizes the importance of using credible spokespeople to explain transportation policies. Also covers promoting public service announcements to get messages out with greater success.

V548 NAPA Paving Practices for Quality This video reviews safety practices pertaining to Hot Mix Applications in three stages including paver operations and roller operations. Covers different tasks performed by laborers and tips on proper paving techniques.

V549 Comparable Concepts for Replacement Housing This video covers how homes and business' are evaluated when being bought for right of way. Explains how homes are evaluated and compared according to space and value. Also covers other factors such as location factors and assessments. Also covers relocations of business, and what is paid out for relocation and what will be reimbursed to business.

V550 New Hampshire Public Works Mutual Aid Program This video explains how local agencies can work together when a disaster strikes. A mutual aid program ensures that public safety is restored quickly and effectively.

V551 Making the Effort Works: Reducing Utility Delays During Construction Showing you how the utility companies and DOT's are working together to ensure fast, efficient, and least expensive work as possible.

V552 Ultra-Thin Whitetopping: Today's Choice for Durable Pavement Overlays This video shows an alternative to HMA for overlays. It provides benefits and a brief overview of the Ultra-Thin Whitetopping process.

V553 Night Lights: How Retroreflectivity Makes Our Roads Safer This video explains what materials are used in the construction of signs, and their value to the driver in bad weather, also discusses updating and sign maintenance.

V554 Earth & Gravel Road Maintenance 5 Part Series. Part 1 - Forest Roads and the Environment, Part 2 - Reading the Traveled Way, Part 3 - Reading Beyond the Traveled Way, Part 4 - Smoothing and Reshaping the Traveled Way, and Part 5 - Maintaining the Ditch and Surface Cross Drains.

V555 Effective Pavement Preservation by Identifying Distress Conditions, Causes, and Cures This video provides a brief description of HMA and PCC pavement distresses. It also provides possible cures for each type of distress.

V556 Qualification-Based Selections This video explains the qualification-based selection process and how it is used for professional or public projects. Explains selection process and how to evaluate and rank different firms for your project. Selection of qualified engineers-architect for projects and avoiding low bid catastrophes.

V557 It's About Time.. Traffic Signal Management: Cost Effective Street Capacity This video discusses traffic movement and ways to improve flow by using existing equipment, or updating equipment to improve traffic flow which may also cure commuting problems such as road rage, traffic accidents and congestion. Timing of traffic lights or lane additions are also options which are also discussed in the video.

V558 Understanding Superpave Mix Design Produced in cooperation with the FHWA, this video explains the basics of Superpave material selection, laboratory compaction, and the required mix evaluation processes. This video is based on the national recommendations; however, IL DOT has made minor changes to the national recommendations.

V559 Sensible Wood Cutting: Tips from the Pros This video provides some basic tips and techniques that can make your cutting experience safer and more productive. It covers: personal protective gear, safety features of Husqvarna chain saws, making a cutting plan, and various felling techniques.

VIDEO/PUBLICATION ORDER FORM

Name _____ Title _____

Agency _____ Phone (____) _____

Address _____

City _____ State _____ Zip _____

Publications Requested:

P _____ # P _____ # P _____ # P _____ # P _____ # P _____ # P _____

L _____ # L _____ # L _____ # L _____ # L _____ # L _____ # L _____

FTB _____ FTB _____ FTB _____

Loan/Reproduction Videotapes Requested: LOAN ☐

Circle or write in the number of the requested videos below. Remember to send one video tape for each video you want copied. If you only want to borrow the tapes, please mark the LOAN box. Loan tapes are limited to a maximum of four tapes per 2 week loan period. Additional requested tapes will be sent after the first order has been returned.

001 002 003 004 005 006 007 008 009 010 011 012 013 014 015 016 017 018 019 020
021 022 023 024 025 026 027 028 029 030 031 032 033 034 035 036 037 038 039 040
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SHRP and Special Interest Videotapes Requested: (For Loan Only)

_____ # _____ # _____ # _____ # _____ # _____ # _____

MAIL REQUESTS TO:

Illinois Department of Transportation
Bureau of Local Roads & Streets
Technology Transfer Center - Room 205
2300 S. Dirksen Parkway
Springfield, IL 62764

FAX (217)785-7296

FOR OFFICE USE ONLY:

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Date Rcv'd. _____

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Illinois Interchange

T² Advisory Committee

The Technology Transfer (T²) Program is a nationwide effort financed jointly by the Federal Highway Administration and individual state departments of transportation. Its purpose is to interchange the latest state-of-the-art technology in the areas of roads and bridges by translating the technology into terms understood by local and state highway or transportation personnel.

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Visit our website at www.dot.state.il.us/blr/t2center.html or E-mail us at T2LRSDOT@nt.dot.state.il.us



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DEC 29 2003

Winter 2003

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

Season's Greetings from the Illinois Technology Transfer Center



Kevin

Roy

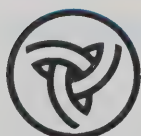
Amy

Kyle

INSIDE:

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- ◆ The Basics of Salting and Sanding 5
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Please pass this on to other
interested parties in your office.



Illinois Department of Transportation



From the Desk of...

What does your agency's Christmas wish list include? How about reducing pothole failures? Potholes continue to be major headache for highway authorities especially at the local level. Because of the continuous freeze thaw cycles, winters in Illinois provide a perfect environment for potholes to occur. Therefore, your agency should consider alternate methods to the decades old practice of throw-and-roll.

According to Strategic Highway Research Program's (SHRP) Report SHRP-H-353 (IL T² Publication # L005), failure rates are significantly improved by using high performance materials or different placement procedures. This report evaluated several high performance material options. The Bureau of Local Roads and Streets recently issued LR 442 Bituminous Patching Mixture for Maintenance Use that includes Group I mixtures, standard emulsions or PG binder for materials, and Group II mixtures, high performance proprietary materials. If used, this special provision will ensure that your agency is using IDOT approved materials. LR Special Provisions may be downloaded at <http://www.dot.state.il.us/blr/lrlist.html>.

The report also found that improved placement procedures - Edge Seal, Semi-Permanent, and Spray Injection - also improved failure rates. Edge Seal and Semi-Permanent are modified versions of throw-and-roll.

With edge sealing, potholes are filled by throw-and-roll; however, the next day the edges of the patch are sealed with a tack coat and then cover aggregate is placed over the tack coat. Semi-Permanent begins by removing all water and debris from the pothole. Next, the pothole sides are squared on all sides, leaving only sound pavement on the edges. Patching material is then placed and compacted in the pothole. While these methods improve the failure rates, they require more time, manpower and lane closures.

Spray Injection technology requires special equipment that is available from several manufacturers; however, regardless of the equipment the process is the same. The equipment allows an operator to clean, fill, and cover a pothole without changing equipment. First, water and debris are blown from the pothole using air flow from the aggregate delivery system. Next, an emulsion is introduced to the air flow to place a tack coat on the pothole. Then, aggregate is added to the air stream creating an emulsified bituminous mixture. The operator fills the pothole with this mixture. Finally, the emulsion is shut off and a cover aggregate is placed over the patch. Depending on the type of equipment, this may be a one or two man operation plus necessary traffic control.

There are two basic equipment

configurations. First, is a self-contained unit that allows the operator to perform the repair from within the cab of the truck. Second, is a trailer or truck mount unit that requires the operator to perform the repair on the pavement. The self-contained unit allows for a one man operation; however, it requires a very skilled operator. The trailer or truck mount unit is easier to operate; however, workers are exposed to traffic. Before purchasing this equipment talk with other agencies that have purchased the equipment. Please contact the T² Center for information on equipment dealers.

Have a safe and happy holiday season.

Kevin Burke

Kevin Burke
T² Program Manager



Teresa Price, IDOT, fills a pothole using spray injection technology with the assistance of Cliff Dickehut of Dura Patcher.

Out in the Cold

By: Mike Ayers, Ph.D., and Steve Waalkes, Contributing Authors

Frost heave

Frost heave – Frost action is best described as the expansion and eventual consolidation of fine-grained soils due to freezing. A number of factors must be present for frost action to occur including:

- A frost-susceptible soil (generally a silt or silty clay);
- An adequate supply moisture (due to infiltration, ground water movement, capillary rise and others); and
- Sustained temperatures below freezing (the soil must freeze – ambient air temperature can be used as a predictor, as can historic climate data).

Frost heave occurs when adequate moisture is present in frost-susceptible soil that is then frozen. These conditions lead to the formation of “ice lenses” in the soil. Because ice occupies a greater volume than water, a wedging action or expansion of the soil results. As the ice lenses form, additional water is drawn in, leading to further expansion. When the soil thaws, the ice lenses melt and consolidation of the soil occurs.

Frost action affects all pavement types, although concrete pavements are less susceptible to it than asphalt pavements. It is most detrimental during the formation of the ice lenses which result in expansion of the soil. Pavement distress typically involves longitudinal cracking and differential vertical movement of the slabs. The

most problematic areas are transition zones between materials of different frost susceptibility.

Methods to minimize or eliminate frost action include:

- Removal of the frost-susceptible soil and replacement with a more suitable material;
- Cross hauling to eliminate differential frost susceptibility;
- Addition of soil modifiers to reduce frost susceptibility; and
- Minimizing the level of moisture present through proper drainage, pavement maintenance and design features.

A pinch of salt

With winter weather comes seasonal pavement maintenance and lots of salt. Although most concrete pavements placed in the last year should have resistance to any detrimental effects of deicing salts, a certain amount of caution should still be exercised before salting.

The concern with putting deicing agents on concrete is based on the ability of the saltwater solution to penetrate into the surface of the concrete and then refreeze. The basic reaction is mechanical – freeze-thaw – and not chemical. Regardless of the deicing chemical, it still melts the ice/snow, which can make the concrete susceptible to scaling (the pavement distress that results from freeze-thaw damage at the surface). However, concrete pavements are designed to be resistant to this effect.

Deicing salts are detrimental to concrete pavements in the following situations:

1. The new pavement has not undergone an air-drying period of 30 days after placement. The 30-day period of air drying allows the concrete to seal and prevent a saltwater solution from penetrating into the concrete;
2. There is inadequate air entrainment. It is best to have around 6% (no less than 3.5%) for harsh freeze-thaw environments; and
3. There was insufficient curing. Acceptable curing methods include: curing compound, plastic sheeting or misting, among others.

Therefore, if the concrete pavements are at least 30 days old, had adequate air and underwent an adequate curing regimen they should survive a harsh, salty winter without problems.

Chill factor

A common question this time of year has to do with the difference between melting rates on light-colored and dark-colored pavements.

There is no clear relationship that darker pavements (new asphalt or dark-colored concrete) will affect ice and snow control to an advantage over lighter surfaces. Older reports have shown a possible 6-8°F temperature differential between concrete and asphalt surfaces exposed to sunlight in

(continued on page 10)

FHWA Has New Look

by Mark Sandifer, FHWA Resource Center - Olympia Fields

Federal Highway Administration has changed in the way the agency's Resource Center is organized to better meet today's transportation challenges.

The new FHWA Resource Center is structured to improve our ability to serve our partners and customers. We now operate as one Resource Center at four locations, with the enhanced capability to provide training and technical assistance across state, national and geographical boundaries. With this new structure, we are also better able to embrace new ways of thinking and become more specialized to support program delivery and technology deployment.

Under the new structure, the FHWA Resource Center will have 10 specialized Technical Service Teams (TST). Each team has a national Team Leader to quickly coordinate responses to your calls and requests. The FHWA Resource Center locations will remain the same, with offices in Atlanta, Baltimore, Olympia Fields (Chicago) and San Francisco.

The new structure enhances unified and coordinated coverage and assistance. Each Team Leader

manages a Technical Service Team with technical specialists located across the country in the FHWA Resource Center offices. This structure allows the team members to align goals and activities on a national scope, continue to provide geographical service to customers, and draw upon the national team for the best practices and additional expertise.

Each FHWA Resource Center

office hosts two to three TST's, and each Team Leader is located in the offices that house his or her specialty:

In each location, the Resource Center has a core staff, which includes Administration, Civil Rights, Information and Analysis, Marketing, Media, Quality and Strategic Planning, and Technology Deployment that supports the efforts of each TST as well as the overall efforts of the Resource Center.

FHWA Resource Centers

www.fhwa.dot.gov/resourcecenter

Atlanta

Construction and Project Management – Rob Elliott, 404-562-3941

Finance – Thay Bishop, 404-562-3695

Pavement and Materials – Monte Symons, 404-562-4782

Baltimore

Geotech and Hydraulics – Peter Osborn, 410-962-0702

Structures – Shoukry Elnahal, 410-962-2362

Olympia Fields

Operation – Martin Knopp, 708-283-3514

Safety – Pat Hasson, 708-283-3595

San Francisco

Air Quality – Robert O'Loughlin, 415-744-3823

Environment – Donald Cote, 415-744-2650

Planning – Lisa Randall, 415-744-2649

FHWA Website Highlights

Specifications: <http://fhwapap04.fhwa.dot.gov/index.jsp>

Winter Maintenance: <http://www.fhwa.dot.gov/winter/index.html>

Asset Management: <http://www.fhwa.dot.gov/infrastructure/asstmgmt/index.htm>

MUTCD: <http://mutcd.fhwa.dot.gov/>

Expertise Locator: <http://highwayexpertise.fhwa.dot.gov/ELMain.nsf/Main?Openagent>

Highway Safety: <http://safety.fhwa.dot.gov/>

Complete List: <http://www.fhwa.dot.gov/fhwaweb.htm>

The Basics of Salting and Sanding

Clearing winter roads to the bare pavement usually requires deicing chemicals. The most common chemical is salt, which usually comes from mined rock salt that has been crushed, screened and treated with an anti-caking agent. Deicing salt is relatively light – just over one ton per cubic yard – and comes as a mixture of 0.375-inch granules to fine crystals.

Another commonly used chemical, calcium chloride, comes from natural brines. It comes dry in pellets or flakes, or in solutions of various concentrations.

Research continues on alternative chemicals. Calcium magnesium acetate is being produced and has few of the negative environmental impacts associated with salt and calcium chloride. Additives to reduce chemical's corrosive properties are also

being used. Currently, these alternative materials are more expensive, but can be useful in special situations.

Deicing chemicals work by lowering the freezing point of water. A 23.3% concentration of salt water freezes at -60 degrees F and a 29.8% solution of calcium chloride freezes at -67 degrees F. These low freezing points are what makes salt and calcium chloride useful.

Before a dry deicing chemical can act, it must dissolve into a brine solution. The necessary moisture can come from snow on the road surface or from water vapor in the air. Calcium chloride has the ability to attract moisture directly from the air.

Changing ice or snow into water requires heat from the air, the sun, the pavement, or traffic friction. Even when the pavement is below freezing, it

holds some heat and can help melt snow and ice.

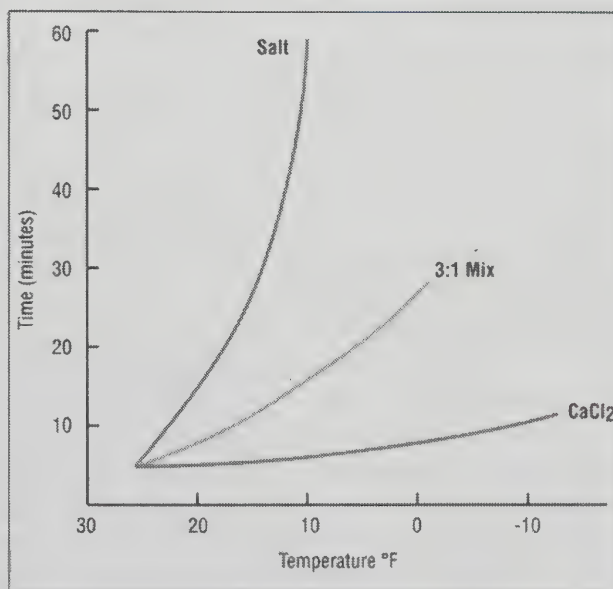
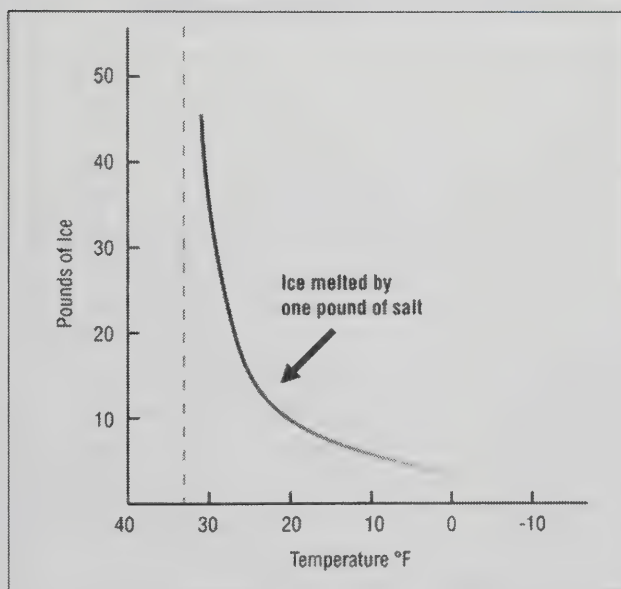
Factors to consider

Chemical concentration, time, pavement temperatures, weather conditions, type of road surface, topography, traffic volume, width of application, and most importantly, time of chemical application all affect the process of melting snow and ice.

If too much chemical is used, not all of it will dissolve into solution and some will be wasted. Too little chemical may not sufficiently lower the solution's freezing point. The ice will not melt or melted snow may refreeze and waste the chemical.

The surface temperature of a snow or ice covered road determines deicing

(continued on page 6)



The Basics of Salting and Sanding

(continued from page 5)

chemical amounts and melting rates. As temperatures go down, the amount of deicer needed to melt a given quantity of ice increases significantly. The graph on page 5 shows that salt can melt five times as much ice at 30 degrees F as at 20 degrees F. The effectiveness of deicing is sensitive to small differences in pavement temperatures.

The longer a deicing chemical has to react, the greater the amount of melting. At temperatures above 20 degrees F, both salt and calcium chloride can melt ice in a reasonable time. At lower temperatures, salt takes much longer.

The sun's heat warms the pavement, speeding up melting. Radiant heat may cause the pavement temperature to rise 10 degrees F or more above the air temperature. On clear nights, pavement temperatures will be lower than air temperatures. Use less chemical when temperatures are rising and more when they are falling.

Applying chemicals during blowing snow and cold temperatures will cause drifting snow to stick to the pavement. If chemicals are not used, the dry snow is likely to blow off the cold road surface.

Ice tends to form where topographic conditions, like high banks or vegetation, screen the road surface from the sun. The longer the area is shaded, the more likely that ice will form. Since pavement temperatures are lower in shaded areas, you may need more chemicals there.

Studies show that snow melts faster when salt is applied in narrow strips. The amount of snow melted

over a long period of time is the same, however, regardless of application width. If you concentrate spreading (withdrawing), you can expose a portion of road surface to the sun quickly. It can then absorb heat and increase the melting rate.

After a road is first plowed, deicing chemicals are usually applied in a window 2- to 4-feet wide down the middle of a two-lane road. To remove glare ice or keep snow in a plowable condition, you may want to apply chemicals across a broader portion of the road.

Timing is the most important factor in successfully clearing snow by chemical treatment. Early application is critical.

Spreading a small amount of deicer when snow is loose and unpacked melts a little snow and turns the rest to slush. Traffic cannot pack down this slushy snow which is 15 to 30% water.

This lets plows remove it easily.

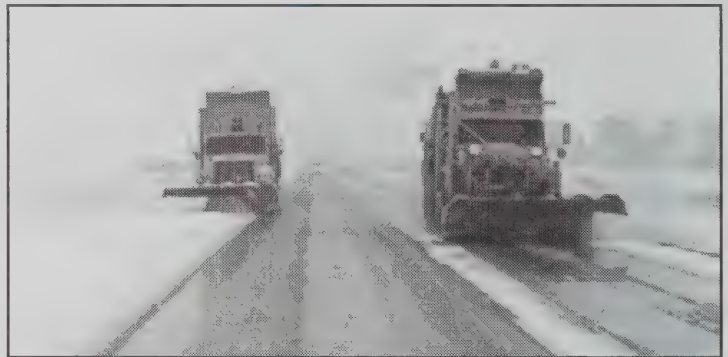
It is better to reapply chemicals as needed than to over-treat initially. Do not plow off the chemical until it has a chance to melt the snow and ice.

Environmental impact

A major concern in using chemicals for winter road maintenance is environmental impact. Studies show that soils, vegetation, water, highway facilities, and vehicles are all affected, so it is very important to use chemicals wisely. Most soil and vegetation

damage occurs within 60 feet of the road and is greatest close to the pavement.

Deicing chemicals are highly soluble and follow any water flow. Salt concentrations in Wisconsin's surface and ground water have increased since the early 1960s, the Wisconsin Department of Natural Resources report, but aquatic life has not yet been affected that we know of. In drinking water sources, which the WDNR also monitors, salt concentrations are within recognized safe limits. In some reported cases, groundwater carrying deicing chemicals has contaminated wells, but most of these apparently were caused by seepage



IDOT snowplows easily remove chemically treated snow.

from poor storage facilities.

Deicing chemicals can accelerate deterioration in concrete and steel structures. New construction methods are reducing this impact, but highways and bridges do suffer from chemical damage. Vehicle corrosion is also accelerated. Corrosion on vehicles and structures is estimated to be the largest cost impact of chloride-based chemicals. Even relatively small amounts of chloride will significantly accelerate existing corrosion.

(continued on page 7)

The Basics of Salting and Sanding

(Continued from page 6)

Storage requirements

Localized environmental damage from salt has come largely from stockpile runoff. Since runoff is at a maximum concentration, any exposed environmental element receives a very large dose. For that reason, you must prevent stockpile runoff from contaminating ground or surface water by covering the salt and storing it on an asphalt base so rain and melt runoff can't seep in. State regulations require highway agencies to store salt inside a covered waterproof structure. When this is not possible, stockpiles must be covered with waterproof material and stored on an impervious pad.

Spreading

No two storms are alike, so no single set of standards will give the proper spreading rate for all storm conditions. Generally, however, only apply enough chemical deicer to permit plows to remove the snow or melt glare ice. Experience shows that it is most effective to spread between 100 and 300 pounds per single lane mile. Do not use any deicer when temperatures are below its effective range. Normally, 15 to 20 degrees F is considered the lower limit for salt. If deicing is necessary at lower temperatures, more salt is needed and melting will take much longer. Other chemicals such as calcium chloride and magnesium chloride may be a better choice.

Because melting action spreads across the pavement to lower areas, concentrate deicers on the center (crown) of two-lane roads and on the high side of curves.

A spreader with a spinner is the

most common way of applying deicers. A spinning circular plate throws the deicer out in a semicircle. Alternatively, a chute can distribute deicer in a window on the road, usually on the centerline.

Spreaders can be equipped with automatic or ground-oriented controls. They automatically regulate application rates as truck speeds fluctuate, so the driver need not to adjust the spreader controls. They are proving effective in reducing waste chemicals.

Calibration is essential for controlling application rates. Different materials will spread at different rates at the same spreader control setting, so you must calibrate spreaders with the material you intend to use. Each spreader must be calibrated separately; even individual spreaders of the same model can vary widely in the amount of material they spread at the same control setting. Furthermore, spreaders operate in a very hostile environment – low temperature, lots of moisture, corrosive chemicals – so, they need to be cleaned and checked every year.

Calcium chloride

Dry calcium chloride requires special handling and is more costly than salt. However, it is effective at temperatures below 0 degrees F and is fast-acting. CaCl actually gives off heat when it dissolves into brine formation. These unique properties make it valuable in severe conditions.

CaCl is usually stored in moisture-proof bags until needed. Otherwise, its ability to draw moisture can cause it to cake and form into large chunks.

A mixture of calcium chloride and salt can be very effective. Even a small amount of calcium chloride will start melting at low temperatures. The

resulting brine and heat allow the salt to start working.

Pre-wetting

Pre-wetting salt has become common. Wetting provides moisture to make brine. Faster melting action may be expected. In addition, the wet salt has less tendency to bounce or be blown off the road by traffic. Savings in lost or wasted salt of over 20 to 30% are possible.

While any liquid deicing chemical can be used to pre-wet, liquid calcium chloride is used widely. Applications of 6 to 10 gallons per cubic yard of salt are recommended. Calcium chloride has the added advantage of producing extra melting due to its effectiveness.

Using salt brine to pre-wet is becoming more common because of its lower cost. Some agencies are producing their own salt brine solution (23%). Liquid CMA and magnesium chloride are also used.

Some agencies spray the salt as it is loaded into the truck. However, the application is more uniform if truck-mounted equipment is used to spray the salt as it leaves the spreader. This also eliminates the problem of handline pre-wetted salt that is not immediately used.

Savings from losing less salt to bouncing and traffic action can more than pay for pre-wetting. However, these benefits only result with lower application rates.

Anti-icing

Anti-icing is a road maintenance strategy that tries to keep the bond between ice and the pavement surface from forming. It involves applying ice-

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McHenry County Highway Department Wins 2003 Excellence In Storage Award

Eight salt storage facilities have won national recognition for the environmental sensitivity of their program as 2003 winners of the Salt Institute's annual "Excellence in Storage Award" competition.

They were selected from among a record number of applicants including the McHenry County Highway Department from Illinois.

In announcing the eight winners at the American Public Works Association Congress in San Diego, Salt Institute president, Richard L. Hanneman singled out the McHenry County Highway Department as having gone well beyond the basics of storing salt on an impervious pad and preventing rain and snow from falling on the pile.

"McHenry County has a beautiful and functional storage building, but this award recognizes the nuts and bolts of sound materials storage and the safety practices that protect the workers in this facility," says Hanneman. "This award isn't for architectural excellence, it's for superior environmental performance. McHenry County Highway Department has an outstanding program. We are proud to have them recognized as a model for all our customers in how to store salt in an environmentally safe manner."

Applications for the year 2003 competition may be obtained from the Salt Institute's web page:

www.saltinstitute.org/40.html
or by contacting:



McHenry County Highway Department salt storage facility.

The Salt Institute at:

700 N. Fairfax St., Suite 600

Alexandria, VA 22314-2040

By Phone 703/549-4648 or

By e-mail at info@saltinstitute.org.

Facilities must have been in operation one year to qualify for entering the contest.

Upcoming Free Training Classes

Listed below are some Technology Transfer Center Training classes where room is still available to enroll. Anyone interested in enrolling can visit the Center's website at <http://www.dot.state.il.us/blr/t2center.html> for further information or to obtain an enrollment form.

Bloomington

Survey I-Beginning	January 27-29, 2004
Survey II-Intermediate	March 2-5, 2004
Survey III-Construction	April 13-15, 2004

Springfield

MFT Acct. & Auditing	April 14, 2004
Confined Space Awareness	January 8, 2004 (a.m.)
Trenching and Shoring	January 8, 2004 (p.m.)

Edwardsville

MFT Acct. & Auditing	April 6, 2004
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Mattoon

Highway Signing	February 26, 2004
Urban Tree Preservation	April 7, 2004

Oglesby

Erosion Control	February 10, 2004
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The Basics of Salting and Sanding

(Continued from page 7)

control chemicals before or at the very beginning of the storm. Using this strategy often reduces total chemical use and allow a higher level of service to the traveling public.

The strategy most commonly used now is deicing – breaking the bond between the ice and the pavement. Obviously, this technique is required once the pavement becomes covered with snow or ice. More chemicals are needed to prevent the initial formation of the ice-pavement bond.

Various ice-control chemicals are being evaluated for anti-icing. Experience shows that liquid chemical applications are more likely to succeed. Liquid salt, magnesium chloride, calcium chloride, CMA, and potassium acetate are being evaluated. Pre-wetted dry chemicals may also prove effective.

Studies during actual storm conditions show that anti-icing produces equal or better road conditions with less chemical use. Liquid chemicals can be applied at fairly low rates (25 to 50 gallons per mile). These liquid chemicals remain on the pavement long enough to work. Several reports note residual effects for several days. The fairly light application rates produce a damp surface rather than flooding it. Of course the pavement temperatures have to be compatible with the effective operating temperatures for the chemical being applied.

Problems can develop if heavy precipitation continues and the storm gets ahead of the anti-icing efforts. Heavy rain, freezing rain, or intense snowfall rates can cause a problem. Under these conditions, you should switch to a normal deicing approach to

accomplish cleanup.

Abrasives

Sand and other abrasives improve vehicle traction on snow- and ice-covered roads. They can be used at all temperatures and are especially valuable when it is too cold for chemical deicers to work. Sand is the most common abrasive, but slag, cinders, and bottom ash from power plants are also used.

Abrasives used for winter road maintenance have some negative environmental impact. They can clog storm water inlets and sewers.

Cleanup may be necessary in urban areas, on bridge decks, and in ditches. The materials may wash downstream and end up in streams and lakes.

Abrasives must be treated with salt to keep them unfrozen and usable. This salt has the same potential impacts described earlier. In particular, salt-treated abrasives can accelerate vehicle corrosion.

Concern has been raised in areas with air pollution. Air pollution from particles less than 10 microns in size has been documented from winter abrasive use. As a result, cleaner abrasives and quicker cleanup after the storm are being required in areas with severe air pollution problems.

For better traction, use material with crushed or angular particles. Very small particles and dirt are actually harmful to traction. Material larger than the #50 sieve is most effective. To minimize windshield damage, use materials in which all particles are smaller than 0.375 inch.

Treating sand with 50 to 100 pounds of salt per cubic yard is necessary to keep it from becoming frozen and unworkable. It also helps

to anchor the sand into the ice surface, makes the sand easier to load from the stockpile, and makes it spread more evenly from mechanical spreaders.

If slag, cinders, or other abrasives are wet, they also need salt to be usable. Add the same amount of salt as for sand. Pre-wetting sand with a liquid deicing chemical just before spreading has proven effective in embedding the abrasive on icy pavements.

Sometimes deicing chemicals are mixed more heavily with sand. The sand gives immediate traction and the chemicals may melt the snow later when the temperature rises. To be effective, the chemical must remain on the pavement, which is difficult to achieve in most cases. Mixing with sand reduces the salt's melting effectiveness.

Abrasives are usually applied only at hazardous locations such as curves, intersections, railroad crossings, and hills. Rates of 500 pounds to 2 cubic yards per mile are common. It is important to calibrate spreaders to control application rates.

Since abrasives must stay on the surface to be effective, they should not be used when they will be covered with more snow or when they will be blown off quickly by traffic. Heavy traffic reduces the effectiveness, requiring repeated application.

(Reprinted from Better Roads Magazine, October 2003. This article courtesy of the Wisconsin Department of Transportation.)

Out in the Cold

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cold climates. However, this is primarily applicable to high-altitude locations where sunshine is predominant during cold temperatures. Many northern states and Canadian provinces receive very little sunshine during the winter months, especially during snowfall events, reducing the effect of solar radiation.

In general, other factors such as temperature, wind velocity and direction, sunshine, terrain, roadway grade and deicing chemicals have a larger influence on snow control than pavement surface color. In fact, the few studies (Montana 1967 and SHRP H-642, 1993) have shown that salt demand is slightly higher on asphalt surfaces than on concrete.

Concrete coming of age

The maturity method is a nondestructive approach for estimating the strength of concrete.

It accounts for the combined effects of time and temperature on concrete strength development. The strength of a given concrete mixture that has been placed properly, consolidated and cured is a function of its age and temperature history.

If the temperature of a freshly placed concrete pavement is measured over time, and those data points are plotted on a graph, the area under the curve can be called the time-temperature factor (TTF), which is a measurement of the concrete's maturity. The logarithm of the TTF directly relates to the strength of the concrete.

In developing the maturity curve for a particular concrete mixture, multiple specimens must be cast, their

temperatures measured over time and their strength determined by conventional destructive testing.

The benefits of maturity include:

- Identifies earliest possible opening to both construction and public traffic;
- Allows determination of optimum time to sawcut joints;
- Facilitates both fast-track and cold-weather construction operations;
- Requires fewer specimens to fabricate and test thereby reducing QC/QA costs; and
- Facilitates earlier agency acceptance and contractor payment.

Insulation blankets

Cement hydration in a freshly placed concrete mixture is an exothermic reaction, which means that it gives off heat. Most of the heat of hydration is generated during the first three days after placement and finishing. However, the concrete must be protected from freezing so that the free water can combine with the cement in the mixture and form the hardened paste.

Insulating blankets, mats or foam sheets are commonly used in cold weather concreting to protect fresh concrete from freezing, allowing hydration to occur at a more rapid rate, because higher temperatures promote faster strength gain. However, insulation blankets do not negate the need for curing compound, which should be applied prior to the blankets.

Concrete should be protected from freezing if air temperature is expected to fall below 40°F in the three days following paving. It is advisable to maintain the concrete temperature above 40°F until the pavement reaches 2,000 psi compressive to continue the

cement hydration reaction. The use of maturity meters is encouraged, because they monitor the temperature and are a very good predictor of strength, as long as the laboratory work and strength correlation curve are determined using project materials prior to paving.

Insulation blankets are capable of holding concrete slab temperatures around 120-140°F, even in cold weather. A repair project constructed in the late fall of 1999 on Highway 401 in Ontario, Canada, used insulation blankets for curing and maintaining the concrete temperature. The full-depth repairs were constructed at night starting at 10 p.m. and opening each morning at 6 a.m. When the blankets were removed to open the lanes for traffic, a thermal shock occurred because the average low temperatures were between 20 and 55°F. Combined with traffic loading, the thermal shock caused most of the patches to crack.

ACI 306R-88 recommends that concrete be cooled gradually – pavements less than 12 in. thick should not experience more than a 50°F drop in temperature. It also states that concrete that is placed and cured at a low temperature (40-55°F) is more durable concrete as long as it is protected from freezing frost.

Studded tire wear

Studded tires only give traction on ice or hard-packed snow. There is no added benefit to the road user when the driving surface is wet or dry pavement. Studded tires are a problem for both concrete and asphalt pavement types, although the damage appears more quickly in asphalt pavements. The steel studs embedded in the tires cause rapid abrasion and wearing of the

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Out in the Cold

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pavement surface in the wheelpath. This can lead to standing water during rainfall and increased possibility of hydroplaning, as well as black ice during winter months.

The first step in trying to eliminate the problem is to ban the use of studded tires altogether. Numerous studies have shown that the added benefit studded tires offer is far outweighed by the additional cost to

repair the pavement damage.

To address problems on existing pavements, diamond grinding will remove the pavement surrounding the worn wheelpaths, in addition to other benefits, including smoother ride, excellent friction and longitudinal texture for low tire-pavement noise.

If studded tires are allowed in the state or region, concrete pavements can be designed to withstand the abrasion from the studded tires. An abrasion-resistant concrete mixture would contain high-quality aggregate,

between 540 and 760 lb/cu yd of cement, plus silica fume, fly ash or slag, with water-cement ratios of 0.22 to 0.36, and would achieve compressive strengths in the range of 12,000 to 19,000 psi.

These abrasion-resistant mixes come with a big price tag. It may be best to focus on eliminating studded tires by statute.

(Reprinted from Road and Bridges, February 2003)



What's New With You?

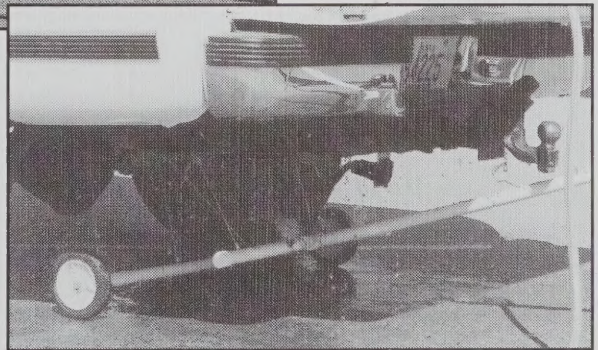
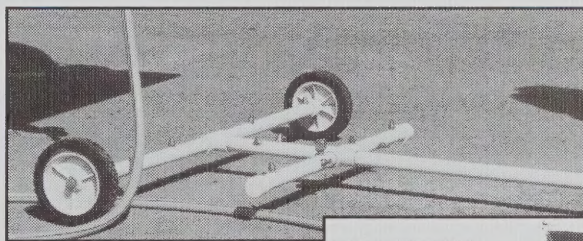
Remove Salt and Sand With Underbody Wash

For a quick and easy way to remove salt and sand buildup from beneath snow removal vehicles and equipment, try the underbody wash. It's effective and lightweight, rolls easily under vehicles, and helps prevent corrosion and wear and tear on parts.

The underbody wash was constructed by the City of Ankeny Public Works Department staff. They built it using one-inch PVC pipe, lawnmower wheels, and pressure nozzles. The wash is 105 inches long and 48 inches wide; it has two cross tubes with 15 pressure nozzles. The nozzles are adjusted to spray in various directions. The water pressure is generated by a gas powered water pump.

For more information about the underbody wash, contact Dennis Guillaume, 515-965-6481.

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Illinois Interchange

The Technology Transfer (T²) Program is a nationwide effort financed jointly by the Federal Highway Administration and individual state departments of transportation. Its purpose is to interchange the latest state-of-the-art technology in the areas of roads and bridges by translating the technology into terms understood by local and state highway or transportation personnel.

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